Patent Claims

1. A heat exchanger, in particular a charge-air cooler for motor vehicles, in particular for utility vehicles, with a heat exchanger unit (2), which comprises tubes (5) having tube ends and in particular fins (6) arranged between the tubes (5), and at least one laterally arranged header box (3, 4) for introducing or discharging a medium, the at least one header box (3, 4) having a bottom with openings for receiving the tube ends, a cover and an inlet or outlet connecting pipe (7, 11), characterized in that the header box (3, 4) is at least partially produced by internal high-pressure forming (IHF) of a metallic semifinished product.

2. The heat exchanger as claimed in claim 1, characterized in that only the cover is produced by IHF and is welded to the bottom.

3. The heat exchanger as claimed in claim 2, characterized in that the semifinished product is a rolled aluminum sheet.

4. The heat exchanger as claimed in claim 1, characterized in that only the cover and the bottom are produced as a single piece from a semifinished product by IHF and are connected to the connecting pipe (7, 11) with a cohesive material joint, in particular are welded or soldered thereto.

5. The heat exchanger as claimed in claim 1, characterized in that the bottom, the cover and the connecting pipe are produced as a single piece by IHF.

6. The heat exchanger as claimed in claim 4 or 5, characterized in that the semifinished product is an extruded aluminum tube.

7. The heat exchanger as claimed in claim 5 or 6, characterized in that the connecting pipe (7, 11) is prebent before the IHF process.

8. The heat exchanger as claimed in one of claims 4 to 7, characterized in that a part (9) of the cover of the header box (4) has a longitudinal bead (10) produced by pressing (from the outside) and/or IHF (from the inside).

9. The heat exchanger as claimed in claim 8, characterized in that the longitudinal bead (10) is of conical design and has a cross section (10a) which increases in a direction pointing away from the connecting pipe (7) while the cross-sectional area (17) of the header box (4) decreases.

10. The heat exchanger as claimed in one of claims 1 to 9, characterized in that, after the IHF process, the header box (4) has at least one open end surface (13) which is closed by a cover (14) which can be soldered into place.

11. The heat exchanger as claimed in one of claims 4 to 10, characterized in that the openings in the bottom (15) are produced by punching, in particular by punching counter to a hydraulic internal high pressure.

12. The heat exchanger as claimed in one of claims 4 to 10, characterized in that the openings in the bottom (15) are produced by prepunching before the IHF and/or by drawing through, in particular drawing through counter to a hydraulic internal high pressure.

13. The heat exchanger as claimed in one of the preceding claims, characterized in that the header box has a wall thickness which, at least in some regions,

preferably for the most part, is greater than 2 mm, in particular greater than 3 mm.

14. The heat exchanger as claimed in one of the preceding claims, characterized in that the header box has a wall thickness which, at least in some regions, preferably for the most part, is smaller than 5 mm, in particular smaller than 4 nm.

15. The heat exchanger as claimed in one of the preceding claims, characterized in that the bottom has a curvature which, at least in some regions, preferably for the most part, has a radius of curvature greater than 100 mm, in particular greater than 200 mm.

16. The heat exchanger as claimed in one of the preceding claims, characterized in that the bottom has a curvature which, at least in some regions, preferably for the most part, has a radius of curvature smaller than 400 mm, in particular smaller than 300 mm.

17. The heat exchanger as claimed in one of the preceding claims, characterized in that the bottom in the transition region to the cover has a curvature which, at least in some regions, preferably for the most part, has a radius of curvature greater than 5 mm, in particular greater than 10 mm.

18. The heat exchanger as claimed in one of the preceding claims, characterized in that the bottom in the transition region to the cover has a curvature which, at least in some regions, preferably for the most part, has a radius of curvature smaller than 20 mm, in particular smaller than 15 mm.

19. The heat exchanger as claimed in one of the preceding claims, characterized in that the header box,

at least in some regions, preferably for the most part, has a step- and/or kink-free cross section.

20. The heat exchanger as claimed in one of the preceding claims, characterized in that a connecting pipe is designed as an end-side extension of the header box and in particular is curved.

21. The heat exchanger as claimed in one of the preceding claims, characterized in that a connecting pipe is arranged laterally on the header box.